

near Baguri Rest House. Similar herds were encountered by us in the western part of the National Park near Kanchanjuri area. We noted two conspicuous whitish hair band one inch wide and 4 inch apart, on throat of all the individuals in the herd sighted by us at Danga Bheel. Similar whitish throat bands were noted on all four individuals, caught and tamed by the villagers.

SUMMARY OF FINDINGS

Buffalo herds with blackish colour and also herds with dun colour were seen in Kaziranga. They also showed different behaviour, that is, buffaloes with blackish colour fled on approach whereas the dun coloured ones were not inclined to panic. The dun coloured buffaloes were encountered within the entire study area.

Two whitish, one inch wide, four inch apart throat bands were seen on the dun colour

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buffalo herds. These bands are not recorded by earlier observers.

The situation in Kaziranga National Park warrants a systematic study of wild buffalo, particularly their genetic status. We opine that large number of domestic buffaloes have been let loose in the park area. Many may be now feral and this is not a desirable state as ultimately their presence will lead to deterioration of the wild stock.

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8. CAUSES OF MORTALITY IN MAMMALS OF BOVIDAE FAMILY IN CAPTIVITY AND FREE LIVING STATE IN INDIA

Diseases of wild ungulates have considerable epidemiological and ecological significance. Apart from having a direct impact on the wildlife populations themselves, the occurrence of communicable diseases in some of the species, constitute a great hazard to domestic livestock populations, particularly in areas where such diseases have been controlled or eradicated. In order to have effective disease control programmes, both in wild and domestic stock, it is essential to know the natural nidi and host range of various infectious agents.

The infectious diseases of Bovidae reported in India are Rinderpest in gaur, wild buffalo, nilgai, chousingha, Black buck (Hallen *et al.* 1871, Burton 1953, Schaller 1967, Gupta and Verma 1949), Anthrax (Peacock 1933), Foot and Mouth Disease (Ali 1935), tuberculosis in captive antelopes and sheep (Liston and Soparkar 1924) etc. Reports of parasitic infestations in Bovidae are scanty (Pande *et al.* 1970, Patnaik and Acharjyo 1970, Sen Gupta 1974).

This paper describes the causes of mortality among various species of Bovidae family en-

countered at Zoological Parks, National Parks, Sanctuaries and reserve forests in different parts of the country.

MATERIALS AND METHODS

The information in respect of mortality recorded during three years (1975-1977) in various species of Bovidae family was obtained from thirteen zoological parks (Bhilai, Bombay, Darjeeling, Delhi, Hyderabad, Juna-garh, Kanpur, Mysore, Pune, Renuka (HP), Shillong, Tutikandi (HP), and Visakhapatnam, one National Park and reserve forests in two States (West Bengal and Jammu & Kashmir).

A total of 220 deaths were recorded in various species of animals which included Gaur (*Bos gaurus*—17 cases); Yak (*Bos grunniens*—1); Gnu (*Connochaetini* sp.—1); Black-buck (*Antilope cervicapra*—86); Chousingha (*Tetracerus quadricornis*—27); Nilgai (*Boselaphus tragocamelus*—25); Eland (*Taurotragus oryx*—10); Chinkara (*Gazella gazella*—21); Goitered gazelle (*Gazella subgutturosa*—2), and Goral *Nemorhaedus goral*—18).

Out of these 220 deaths, 8 were recorded in free living state and remaining 212 in captivity.

In addition, 39 cases of deaths were recorded in wild goats and 2 in wild sheep. However, the exact taxonomic nomenclature of these members of sub-family Caprinae could not be determined.

RESULTS AND DISCUSSION

The recorded causes of deaths have been classified into specific diseases, non specific disease conditions and diseases due to undetermined etiology. As shown in Table 1, Rinderpest was recorded as a major cause of

death in gaur (*B. gaurus*) accounting for 9 out of 17 deaths in this species. Eight cases were recorded at the Hyderabad Zoo and one at the Mysore Zoo. During the rinderpest outbreak at Nehru Zoological Park, Hyderabad in the months of January-February, 1979, all the six animals kept in one enclosure died. No other zoo animal was affected. Cases of Rinderpest had been recorded among pigs in a village close to the zoo, about ten days before the onset of disease in gaurs. The exact source and method of transmission of disease could not be detected.

Among 220 deaths pertaining to 11 species of animals, tuberculosis was recorded only in Blackbuck (*Antilope cervicapra*). Three cases were recorded at Bombay Zoological Garden and two at Delhi Zoological Park. At both the places, tuberculosis was diagnosed also in spotted deer and monkeys. It would appear that among the members of Bovidae family, Black bucks are most susceptible to tuberculosis.

An isolated case of Anthrax was recorded in Chinkara (*G. gazella*) at Kanpur Zoo. No other animal was reported to be affected. Similarly a case of Black Quarter was recorded at Shillong Zoo in Blackbuck.

Deaths due to parasitic diseases were recorded in 14 cases. The cases of babesiosis were recorded in one gaur and one Black buck at Bhilai Zoo and a Chinkara at Kanpur Zoo. Trypanosomiasis in one Nilgai was recorded at Kanpur Zoo. At the Nehru Zoological Park, Hyderabad, one Chinkara died due to Coccidiosis. Helminthic infestations were responsible for six deaths in four species (Yak—1, Blackbuck—2, Chousingha—2, and Goral—1) whereas ectoparasites (unspecified) accounted for 3 deaths in goitered gazelle.

A male wild gaur of about 8 years age died of horn cancer in the reserve forest of Jal-

TABLE 1
RECORDED CAUSES OF DEATHS IN MEMBERS OF BOVIDAE FAMILY

Sl. No.	Causes of death	Gaur	Yak	Gnu	Black buck	Nilgai	Chou- singha	Eland	Chin- kara	Goitered gazelle	Thomson Goral	Total
1.	Rinderpest	9	—	—	—	—	—	—	—	—	—	9
2.	Tuberculosis	—	—	—	5	—	—	—	—	—	—	5
3.	Parasitic* diseases	01 (Bab.)	—	—	01 (Bab.)	—	—	—	01 (Bab.)	—	—	14
			01 (Fasc)	—	2 (Taen)	01 (Tryp)	2 (RW)	—	01 (Cocci)	3 (Ect)	01 (Taen)	2
4.	Anaerobic Infections	—	—	—	01 (B.Q.)	—	—	—	01 Anthrax	—	—	2
5.	Horn Cancer	01	—	01	—	—	—	—	—	—	—	2
6.	Pneumonia	—	—	—	11	6	3	—	2	—	8	30
7.	Gastroenteritis	2	—	—	5	02	3	01	—	2	6	21
8.	Hepatitis	—	—	—	5	01	—	—	01	—	1	8
9.	General debility and anaemia	—	—	—	17	2	4	3	3	5	—	34
10.	Dystokia/Metritis	—	—	—	—	1	—	1	—	—	—	3
11.	Heat Stress	—	—	—	1	—	2	—	—	1	—	4
12.	Navel ill	—	—	—	1	—	—	—	—	—	—	1
13.	Typanitis	—	—	—	2	1	—	—	1	1	—	5
14.	Hernia	—	—	—	1	—	—	1	—	—	—	2
15.	Injury	4	—	—	22	6	4	2	6	—	—	44
16.	Miscellaneous	—	—	—	12	5	9	2	5	0	2	36
TOTAL		17	01	01	86	25	27	10	21	12	2	220

* Abbreviations used:—Bab = Babesiosis; Cocci = Coccidiosis; Tryp = Trypanosomiasis; Taen = Taeniasis; Fasc = Fascioliasis; Ect = Ectoparasite; RW = Roundworm; B.Q. = Black Quarter.

MISCELLANEOUS NOTES

paiguri. A second case of Horn cancer was recorded in a 22 year old male Gnu at Bombay Zoological Gardens.

The deaths due to pneumonia, gastroenteritis, anemia and general debility were recorded in 13.6 per cent, 9.1 per cent and 15.4 per cent of the total deaths respectively. These disease conditions are, to a great extent, due to faulty management or malnutrition and hence can be minimised or prevented by improving the management practices.

Deaths due to injuries were recorded in 20 per cent of the total cases. In the majority of cases, injuries were inflicted during intra or inter species fighting, accidents, or at times, during capture operations for treatment and other managemental purposes. As such, the losses due to trauma can be prevented by using chemical transquillizers and by improving management practices etc.

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The disease conditions responsible for mortality in wild goats were Pneumonia (6 cases), gastroenteritis (10), general debility and anaemia (6), injury (5), hepatitis (1), and undetermined causes (11). The recorded causes of mortality in two wild sheep were undetermined etiology (1), enteritis (1).

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